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The Coal Situation

A quarterly review from Energy Economics — THE CHASE MANHATTAN BANK, N.A. NEW YORK, N.Y. 10081

Vol. 1 — No. 1
JULY, 1980

WORLD COAL OUTLOOK

The contribution of coal to world energy needs, particularly in the western world, may appear to be an engima, given the size of known reserves and the economic, social, and political difficulties that were created by the oil events of 1973-74. In actuality, there is very little mystery surrounding the less than full realization of the post-embargo expectations for coal.

Quite simply, the increased emphasis on coal has brought into sharp focus the conflict between energy and environmental policies. The 1974 oil price increases overcame the inherently higher costs of transporting, storing and burning coal. This economic advantage was substantially moderated by the added costs associated with using it in a manner consistent with environmental legislation and regulations. The net effect was an erosion of the initial high interest in coal. In 1979, the renewed instability and dramatic price increases in world oil markets produced a major change in the social and economic attractiveness of coal. Society is now re-examining the trade-offs it is willing to accept between the environment and economic activity. It is more important, however, that the price increases in 1979 and expectations for continued instability in world oil markets have made the environmentally acceptable use of coal affordable. This fact is illustrated in Table 1.

TABLE 1

RELATIVE FOSSIL FUEL COST
FOR LARGE INDUSTRIAL USES

	1978 Relative Costs*	1980 Relative Costs*	1990 Relative Costs*
Coal**	100	100	100
Low Sulfur Fuel Oil	81	107	129
Natural Gas	70	106	125

* includes capital costs, operation and maintenance expenses, and the cost of fuel.

** includes all costs associated with complying with sulfur emission standards, particulate emissions standards, and waste disposal.

Sources: ICF, Inc., and Energy Economics.

Table 1 shows a comparison of the relative cost of new installations for the three fossil fuel alternatives available to a large industrial consumer in the United States. The total costs of each alternative are indexed relative to coal, including all the costs of complying with existing or anticipated environmental standards for sulfur, particulate matter, and waste disposal. The first column indicates the situation faced by the industrial user in 1978. At that time, oil held a 19 percent advantage and natural gas a 30 percent advantage over coal. As a result of the price increases beginning in 1979, coal now enjoys a 7 percent and 6 percent relative advantage over the oil and natural gas options, even with the imposition of environmental control requirements.

Over the long term, environmental issues aside, the cost advantage for coal is expected to widen, as oil and natural gas prices escalate at rates greater than those anticipated for coal. It is possible that the gap between coal and the alternatives shown in the last column of Table 1 will be smaller as the emphasis on further environmental improvements accelerates in response to increased coal use. The overall relative advantage is expected to remain with coal, however, thus leading to its increased replacement of oil or natural gas.

Further supporting the outlook for the increased consumption of coal is the growing level of concern surrounding the nuclear option for electric power generation. Even before the Three Mile Island incident some felt that technical, social, and political difficulties such as proliferation and nuclear waste disposal were making the nuclear option less attractive. Three Mile Island served to emphasize the areas of safety and financial risk.

The effects on coal have been two-fold. First, current consumption and future demand have increased because of the more intensive use of existing coal-fired units and the replacement of planned nuclear capacity with new coal-fired generation. Thus, coal has directly benefited from the downward revision of plans for nuclear capacity expansion. But this downward revision has not led to a one-for-one increase in planned coal-fired capacity, which leads to the second point. Some of the reduction in nuclear capacity plans is of course due to the new lower forecasts of electricity demands. Thus, some of the nuclear capacity reduction will not be replaced by coal, at least not on the same schedule. In fact, new coal-fired units

are not immune to the effects of lower growth in electrical demands. Overall, however, coal demand will be higher because of problems facing nuclear power generation.

Finally, there is potential for a major new use of coal as a feedstock in the synthetic production of gaseous and liquid energy products. Although there has been a marked improvement in the relative attractiveness of using coal in this application, key uncertainties are expected to retard its early widespread use. The major uncertainty pertains to the cost estimates of the coal-use facilities relative to the future cost and availability of alternative sources of the same or similar products.

Currently, these uncertainties imply a need for government support in the form of direct subsidy and/or guarantees in order to launch a synthetic fuels industry in a timely fashion. In the United States such actions are being pursued although they will not produce meaningful results until 1985 and beyond because of the lead times required. Regardless of the future of coal-based synthetics, the coal industry is expected to grow rapidly, principally in response to the needs for direct thermal or steam applications in the industrial and utility sectors.

Figure 1 shows the historical and forecasted world coal consumption for the period 1973 through 1990. Plotted separately are coal's two general market applications, steam (thermal) and metallurgical (coking) coal. As shown, steam coal is expected to be the fastest growing market application, with total consumption increasing by more than 2 billion tons over the 1978 level of 3.2 billion tons. In terms of rates of growth, steam coal demands are expected to increase an average of 4.4 percent per year between 1978 and 1990, versus an historical rate of 3.2 percent per year between 1973 and 1978.

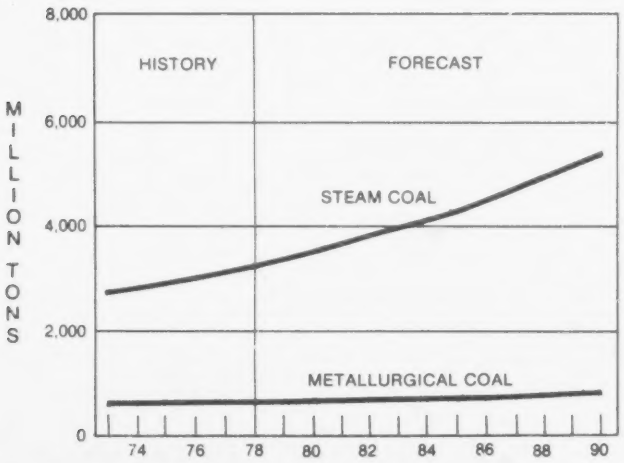
Between 1978 and 1990, the worldwide consumption of metallurgical coal is expected to grow relatively slowly at an average rate of only 2.3 percent per year. The softness of the metallurgical coal sector reflects slower steel industry expansion in response to lower economic activity, changing steelmaking technologies, and substitution effects such as the trend to smaller and lighter automobiles and the trend to less energy-intensive or energy-saving materials.

Although coal's future is bright, its future rate of growth is still quite uncertain. In particular, demand growth in the steam coal market sector is uncertain due to three important factors: environmental concerns, the level of nuclear expansion and electricity demands, and infrastructural expansion needed to support coal production, transportation, and use.

The effects of varying the assumptions in these areas are illustrated in the graph of Free World steam coal demands through 1990 shown in Figure 2. As the figure shows, the uncertainties suggest greater downside risk than upside potential. The pessimistic forecast for 1990 shows demand 365 million tons lower than the best estimate projection, while the optimistic forecast is not quite 180 million tons greater. Even under the pessimistic scenario, however, higher oil and natural gas prices and lower nuclear expansion produce a rate of growth higher than recent history. Under the pessimistic scenario, coal usage is expected to expand at an average annual rate of 3.5 percent per year between 1978 and 1990. Growth between 1973-78 averaged 2.8 per year, while consumption during the 5-year period prior to the oil embargo of 1973-74 *declined* by an average of 0.2 percent per year.

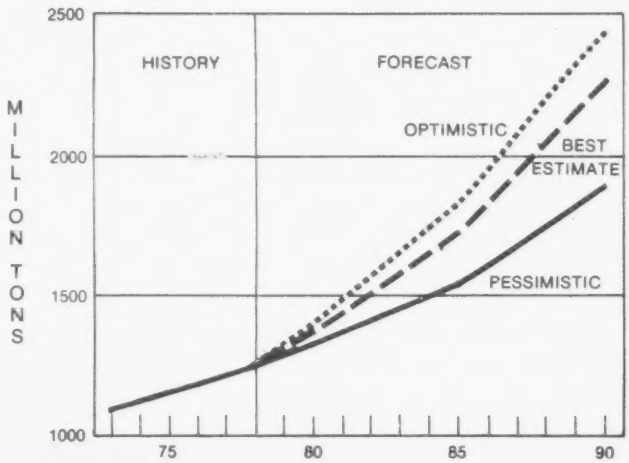
The increase in world coal consumption will bring with it a rapid expansion in international coal trade. The level of net trade is expected to almost

Figure 1
World Coal Consumption 1973-1990



Source: Energy Economics

Figure 2
Uncertainty Surrounding Free World Steam Coal Consumption 1973-1990



Source: Energy Economics

double, reaching 356 million short tons by 1990 versus 136 million tons traded in 1978. As is the case in total consumption, steam coal is expected to be the most rapidly expanding portion of the international market for coal. In 1978, steam coal represented 36 percent of the total level of net coal trade. By 1990, steam coal trade is expected to account for 52 percent of the coal moved internationally. Electric power generation will be the largest end-use application as oil-importing nations pursue the replacement of existing oil-fired power plants and respond to growth in electricity demand.

Table 2 shows the actual 1978 and forecasted 1990 levels of net imports for steam and metallurgical coal in the major market areas of the world. As indicated, Europe is expected to remain the largest single market outlet for steam coal, with net imports reaching 135 million tons per year by 1990 versus 36 million tons in 1978. The Asian market, led by Japan, Taiwan and South Korea, is expected to show the highest rate of growth through the forecast period. By 1990, the Asian net imports are expected to show an almost 10 fold increase over the 4 million tons imported in 1978.

TABLE 2

MAJOR NET IMPORTERS

(Million Short Tons)

	Steam Coal		Metallurgical Coal	
	1978	1990	1978	1990
Europe	36	135	24	49
Asia	4	39	59	79
Other	9	12	4	42
Total	49	186	87	170

Source: Energy Economics

In the case of metallurgical coal, Asia, principally Japan, is expected to remain the largest market outlet, accounting for 79 million tons by 1990. With imports of 49 million tons in 1990, Europe remains the second largest market for international metallurgical coal supplies. "Other" markets, however, show the largest rate of growth. Planned expansion of the Latin American steel industry accounts for the majority of the forecasted imports in this segment of the market.

In supplying coal to the international markets, South Africa is expected to continue its domination of the steam coal sector while the United States and Australia are the dominant net suppliers of metallurgical coal. Table 3 shows the actual 1978 and forecasted 1990 levels of trade for the major net exporters of coal. As is indicated, South African steam coal exports are 80 million tons in 1990, which would be more than double that of its closest rival. This situation not only reflects South Africa's competitive advantage in mining costs, but also, and more importantly, its transportation advantages in getting the coal from the mine to the final user. The United States and Australia, as a result of their endowment of metallurgical grade coal resources and their capabilities to meet a growing market will continue to dominate this sector. Both are expected to almost double their exports of metallurgical coal, with each supplying 70 million tons by 1990.

TABLE 3

MAJOR NET EXPORTERS

(Million Short Tons)

	Steam Coal		Metallurgical Coal	
	1978	1990	1978	1990
United States	8	30	30	70
South Africa	15	80	2	3
Australia	6	35	37	70
Other	20	41	18	27
Total	49	186	87	170

Source: Energy Economics

In summary, although the future is not without uncertainty, the outlook for coal demand is encouraging. The paramount concern in coal's future will continue to be the impact of its usage on the world's environment. In particular there will be the growing concern over acid rain and carbon dioxide build-ups. Nevertheless, the reaffirmation in 1979 of the economic, social, and political costs of the world's continued over-dependence on oil makes it more likely that these environmental problems will be dealt with on an overall cost/benefit basis.

The world coal industry faces a future of opportunity and challenge: opportunity of growing markets and the challenge to respond. The next issue of *The Coal Situation* will examine the capital needed to support the anticipated growth of the world's coal industry.

Vincent J. Calarco, Jr.

IMPORTANT NOTICE

This is the first issue of Energy Economics' **Coal Situation. The Coal Situation** joins its sister publication, The Petroleum Situation, as a brief, periodic review of an important energy field.

The Coal Situation will be published quarterly, and is free of charge. The contents of each issue will include a lead article providing The Chase Manhattan Bank assessment of a significant element of the coal energy sector, such as this issue's "World Coal Outlook," as well as highlights and statistical tables of the world coal market's performance.

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UNITED STATES COAL BALANCES

	JANUARY THRU MARCH 1980	1979	CHANGE
	Million Short Tons		-%-
Consumption			
Electric Utilities	144.57	130.57	10.72
Coke Plants	18.78	19.28	-2.59
General Industry	19.39*	17.96	7.96
Retail Deliveries	3.08*	2.87	7.32
Total Domestic Demand	185.82*	170.68	8.87
Exports	14.13	10.97	28.81
Total Demand	199.95*	181.66	10.07
Supply			
Domestic Production	197.16	176.88	11.47
Imports	0.41	0.56	-26.79
Total New Supply	197.56	177.44	11.34
Stock Change	-2.39	-4.21	–

Totals may not add due to rounding
*Estimated

Sources: U.S. Department of Energy
National Coal Association
Chase Manhattan Bank

EUROPEAN ECONOMIC COMMUNITY COAL BALANCES – HARD COAL

	JANUARY THRU MARCH 1980	1979	CHANGE
	Million Short Tons		-%-
Deliveries to:			
Power Stations	53.56*	42.82	25.08
Coke Plants	24.89*	23.46	6.10
General Industry	6.63*	6.38	3.92
Households & Miners' Coal	5.73*	5.84	-1.88
Total Domestic Demand	90.81*	78.50	15.68
Exports	0.37	0.77	-47.05
Total Demand	91.18	79.27	15.02
Supply			
Domestic Production	84.87	71.09	19.38
Imports (third-party countries)	18.02	12.67	42.23
Total New Supply	102.89	83.76	22.84
Stock Change	11.71	4.49	–

Totals may not add due to rounding
*Estimated

Sources: Eurostat
Chase Manhattan Bank

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